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May 3, 2001

BOX PCT

Commissioner for Patents
Washington, D.C. 20231

PCT/EP98/07131
-filed November 9, 1998

Re: Application of Soren WESTERMANN
METHOD FOR IN-SITU MEASURING AND CORRECTING OR ADJUSTING THE OUTPUT SIGNAL OF A HEARING AID WITH A MODEL PROCESSOR AND HEARING AID EMPLOYING SUCH A METHOD
Our Ref: Q63556

Dear Sir:

The following documents and fees are submitted herewith in connection with the above application for the purpose of entering the National stage under 35 U.S.C. § 371 and in accordance with Chapter II of the Patent Cooperation Treaty:

- ☑ an executed Declaration and Power of Attorney.
- ☑ a copy of the International Application with Article 34 amended sheets incorporated for the Examiner's convenience.
- ☑ 2 sheets of drawings.
- ☐ an English translation of Article 19 claim amendments.
- ☑ an executed Assignment and PTO 1595 form.
- ☑ a Form PTO-1449 listing the ISR references, and copy of the International Search Report
- ☑ a Preliminary Amendment

It is assumed that copies of the International Application, the International Search Report, the International Preliminary Examination Report, and any Articles 19 and 34 amendments as required by § 371(c) will be supplied directly by the International Bureau, but if further copies are needed, the undersigned can easily provide them upon request.

PLEASE SEE THE ATTACHED PRELIMINARY AMENDMENT BEFORE CALCULATING THEE

The Government filing fee is calculated as follows:

Total claims	17	-	20	=		x	$18.00	= $.00
Independent claims	2	-	3	=		x	$80.00	= $.00
Base Fee								$860.00
TOTAL FILING FEE								$860.00
Recordation of Assignment								$ 40.00
TOTAL FEE								$900.00

Checks for the statutory filing fee of $860.00 and Assignment recordation fee of $40.00 are attached. You are also directed and authorized to charge or credit any difference or overpayment to Deposit Account No. 19-4880. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16, 1.17 and 1.492 which may be required during the entire pendency of the application to Deposit Account No. 19-4880. A duplicate copy of this transmittal letter is attached.

Priority is claimed from November 09, 1998 based on PCT/EP98/07131.

Respectfully submitted,

David J. Cushing
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Date: May 3, 2001

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of	PCT/EP98/07131
Soren WESTERMANN	Attorney Docket Q63556
Appln. No.: Not Assigned	Group Art Unit: Not Assigned
Confirmation No.: Not Assigned	Examiner: Not Assigned

Filed: May 03, 2001

For: METHOD FOR IN-SITU MEASURING AND CORRECTING OR ADJUSTING THE OUTPUT SIGNAL OF A HEARING AID WITH A MODEL PROCESSOR AND HEARING AID EMPLOYING SUCH A METHOD

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Please insert the following section headings:

Page 1, after the title, insert the heading:

Background of the Invention

Page 2a, before the second paragraph beginning with "These objects", insert the heading:

Summary of the Invention

Page 3, before the second paragraph, beginning with "The invention" insert the heading:

Brief Description of the Drawings

before the fourth paragraph, beginning with "In the hearing aid" insert the heading:

Detailed Description of the Invention

IN THE CLAIMS:

Please enter the following amended claims:

4. (Amended)Method according to claim 1, characterized by using said material difference from said comparison as an error signal for said parameter adjustment processor (7) to modify the model in said model processor.

5. (Amended) Method according to claim 1 characterized by using said material difference of said comparison as an error signal for said parameter adjustment processor (7) to adjust the transformation parameters of said digital signal processor (2) and said model function in said model processor (6).

6. (Amended)Method according to claim 1, characterized by using said material difference from said comparison as an error signal for a process in a microphone signal correction processor (9) connected between said sensing means (4) and said comparison means (5).

7. (Amended)Method according to claim 1, characterized by using said material difference from said comparison as an error signal to modify the transformed signal of said digital signal processor (2) in a modification means(8).

IN THE ABSTRACT:

Please delete the present Abstract of the Disclosure and replace it with the following new Abstract of the Disclosure.

ABSTRACT

The application relates to an in-situ method to measure and correct or adjust sound signal presented to the eardrum by means of a hearing aid and a hearing aid employing such a method. The hearing aid comprises at least one microphone (1), at least one digital signal processor (2) for transforming the microphone signal into a transformed signal according to a desired transformation function, a receiver (3), a sensing means (4) for sensing the sound signal appearing in front of the eardrum and at least one comparison mans (5). A model of the electroacoustic system of the ear and the hearing aid is established and stored in the hearing aid, which model simulates the sound signal in the ear canal in front of the eardrum. The model is adapted in response of an error signal generated in case the difference between the representation of the sensed signal and the simulated sound signal and the simulated sound signal is above a predetermined threshold.

REMARKS

Entry and consideration of this Amendment is respectfully requested.

Applicant also advises the Examiner that this application is related to Attorney Docket Q63555 filed May 3, 2001, entitled "Method for In-Situ Measuring and In-Situ Correcting or Adjusting a Signal Process in a Hearing Aid with a Reference Signal Processor".

Respectfully submitted,

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Date: May 3, 2001

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows. The following section headings were added:

Page 1, after the title, insert the heading:

Background of the Invention

Page 2a, before the second paragraph beginning with "These objects", insert the heading:

Summary of the Invention

Page 3, before the second paragraph, beginning with "The invention" insert the heading:

Brief Description of the Drawings

before the fourth paragraph, beginning with "In the hearing aid" insert the heading:

Detailed Description of the Invention

IN THE CLAIMS:

The claims are amended as follows:

4. (Amended)Method according to ~~anyone of the claims 1 to 3~~claim 1, characterized by using said material difference from said comparison as an error signal for said parameter adjustment processor (7) to modify the model in said model processor.

5. (Amended) Method according to ~~anyone of the claims 1 to 4~~claim 1 characterized by using said material difference of said comparison as an error signal for said parameter adjustment processor (7) to adjust the transformation parameters of said digital signal processor (2) and said model function in said model processor (6).

6. (Amended)Method according to ~~anyone of the claims 1 to 5~~claim 1, characterized by using said material difference from said comparison as an error signal for a process in a microphone signal correction processor (9) connected between said sensing means (4) and said comparison means (5).

7. (Amended)Method according to ~~anyone of the claims 1 to 3~~claim 1, characterized by using said material difference from said comparison as an error signal to modify the transformed signal of said digital signal processor (2) in a modification means(8).

METHOD FOR IN-SITU MEASURING AND CORRECTING OR ADJUSTING THE OUTPUT SIGNAL OF A HEARING AID WITH A MODEL PROCESSOR AND HEARING AID EMPLOYING SUCH A METHOD

The invention relates to a method to measure and correct or adjust the sound signal presented to the eardrum by means of a hearing aid in the operational position, including at least one microphone, at least one digital signal processing system comprising at least one digital signal processor for transforming the incoming sound signal into a transformed signal in conformity with the desired transformation function, and at least one receiver and a power supply, and having at least one sensing means for sensing the signal appearing in front of the eardrum, and at least one comparison means.

Measurements and corrections for linear or nonlinear distortions in hearing aids are known from the prior art, particularly from German Publication DE 28 085 16, which discloses a hearing aid, which in addition to the receiver uses a measurement microphone or probe microphone, which could be separate from the receiver or incorporated or integrated into the receiver. This microphone picks up the sound environment in the ear canal in front of the eardrum and is used for the compensation of linear and/or nonlinear distortions of the signal.

The instantaneous analog values of the output signal of the probe microphone are applied at one input of a differential amplifier, the second input of which receives the undistorted output signal of a preamplifier of the hearing aid. The output signal of the differential amplifier is then applied as a correction voltage which is added to the input signal of the output amplifier, resulting in a corrected output signal from the receiver.

Thus, the probe microphone and the differential amplifier are part of a feedback loop for correcting distortions of the output signals of a hearing aid.

However, this known system can not adapt itself in real time to instantaneous variations of the entire electroacoustic system, comprising of the ear and the hearing aid, preferably a programmable or program controlled digital hearing aid system.

In US-A 4,596,902, a hearing aid is disclosed haveing a feedback microphone located in the ear canal when the hearing aid is in use. The feedback microphone monitors actual sound pressure levels in the ear canal, and the hearing aid adjusts individual gains in a plurality of frequency bands in response to a comparison of the monitored sound pressure in the ear canal and in the frequency band in question with a respective predetermined value so that the sound pressure level is kept below a loudness discomfort level in each frequency band.

In Widin G.P: "The meaning of digital technology", Hearing Instruments, vol. 38, No. 11,1 November 1987, various types of use of digital signal processing in hearing aids are discussed in general. The discussion is divided into discussions of use of computers in hearing instrument fitting, use of digital circuitry to control analogue electronics, use of digital signal processing to replace analogue circuits to accomplish standard hearing instrument functions, and use of digital techniques to produce new kinds of signal processing, such as noise suppression.

CH 624 524 A discloses a hearing aid with a microphone, an amplifier and a loudspeaker. The hearing aid further comprises a feedback microphone for monitoring sound emitted by the loudspeaker and generating an output signal that is fed back into the amplifier for correction of the output generated by the hearing aid.

It is an object of the present invention to create and develop a novel method for an instantaneous measurement and correction or adaption of the sound environment in front of the eardrum, even including occlusion effects and other foreign signals or sounds influencing the sound field in front of the eardrum, to a desired sound signal.

A model function of this type may be developed and one may even be able to predict or anticipate changes in the sound environment in front of the eardrum by such a method.

These objects are achieved by means of a method of the kind referred to above which in accordance with the invention is characterized by establishing a model of the electroacoustic system of comprising the ear and the hearing aid, said model simulating the actual sound signal in the ear in front of the eardrum, and storing said model in the hearing aid, sensing the actual signal appearing in front of the eardrum, converting said sound signal into a digital representation and feeding it back to an input of the digital signal processing system, comparing said digital representation of said sensed signal with said model in said comparison means and, in case there is a material difference between the sensed signal and the model, to generate an error signal for adjusting said model to the actual sound environment in front of the eardrum, and by further using said error signal to adaptively modify the process in said digital signal processor by minimizing said error signal.

It is particularly advantageous, if the entire operation is performed digitally, which would lead to large scale integration of most or almost all components of the system.

Further advantages of the invention will become apparent from the remaining claims and the description.

The invention will now be described in detail with respect to several embodiments shown in the attached drawings.

In the drawings

Fig. 1 shows schematically a first embodiment of a hearing aid to be used for practising the inventive method;

Fig. 2 shows schematically a second embodiment of such a hearing aid;

Fig. 3 shows a third embodiment of said hearing aid and

Fig. 4 shows another embodiment of said hearing aid .

In the hearing aid as shown schematically in Fig. 1, the acoustical sound pressure prevailing in the environment surrounding the user is picked up by an input transducer of the hearing aid, in this case a microphone 1. The output signal of microphone 1 is applied to a processing system, preferably a digital signal processing system operating in accordance with the present invention and containing at least one digital signal processor 2, which processes the incoming signal in accordance with the hearing deficiency of the user and to the prevailing acoustical environmental situation. The output of the digital processor 2 is passed on to an output transducer, in this case a receiver 3.

The sound pressure levels in the earcanal are sensed by at least one sensing means, in this case by a probe microphone 4 that can be separate from the receiver, or incorporated into the receiver.

Equally, the receiver could be used also as a probe transducer or as such in combination with a probe microphone.

Principally, while the drawings show a hearing aid for performing

the inventive method as a single channel hearing aid, it is to be understood that, obviously, the invention is by no means limited to single channel hearing aids but is, preferably so, also applicable to multi-channel hearing aids.

Also it is to be understood that in place of one input transducer or microphone several microphones could be provided as well as any other conceivable type of input transducer producing an input signal.

The output transducer could as well be any type of output transducer that produces an output signal, f.i. a sound signal in front of the eardrum.

Furthermore, analog to digital and digital to analog converters would have to be employed, where required, preferably in the form of sigma-delta-converters.

The sensing means, i.e. the probe microphone 4 is directly or indirectly connected to a comparison means 5. Furthermore there is shown a model processor 6 which receives one input signal from the input side of the digital signal processor 2 or from the output of the microphone 1. The model processor 6 is also connected to the comparison means. When, initially, establishing the model function, the entire system has to be taken into account, i.e. the comp.ete ear including the outer ear with the earlobe as well as the eardrum and the inner ear and also the hearing aid. This means that, when establishing the model in the customary way all facets of the ear and the hearing aid have to be taken into consideration. This model then may perform a representative simulation of the actual sound signal in front of the eardrum.

The establishment of such a model is a well known scientific research tool.

However, in the present case, this model, once it is established, as a model function, it is to be stored in the hearing aid, preferably in the model processor 6.

It has to be understood that this model processor 6, at least basically or in parts may operate in a manner similar to the operation of the digital signal processor 2 in conjunction with the output transducer ot receiver and the sensing means.

This process, of course, is adjustable by the operation of the entire circuitry.

Finally, preferably in combination with the model processor 6 a parameter adjustment processor 7 is provided and is also connected to the comparison means.

Of course, in a preferred embodiment of such a hearing aid to be used for practising the inventive method, all operations in the various circuits are performed digitally. This means that between the microphone 1 and the digital signal processor 2 an analog to digital converter has to be provided. The same applies to the connection between the sensing means 4, i.e. the probe microphone and the comparison means 5. Since the model processor 6 is also operating digitally, the signals applied to the model processor 6 have to be in digital form or must be converted into digital form in the model processor 6. The parameter adjustment processor 7 will also be operated digitally with the same requirements.

In operation, after establishing the model function in the model processor 6, the ambient sound spectrum prevailing is picked up by the microphone 1 and operated on in the digital signal processor 2 in accordance with the parameters set into the hearing aid, transforming the incoming sound signal into a desired sound signal in front of the eardrum by means of an output transducer, i.e. the receiver 3.

The sensing means 4, i.e. the probe microphone senses the signal or the sound pressure level in front of the eardrum. The output signal of the probe microphone is then, either directly or indirectly applied to the comparison means 5 which also receives the signal from the

model processor 6 as a second input signal. If, at the comparison means 5, a material difference is detected between the two signals, an error signal is developed. This error signal is applied to the parameter adjustment processor 7 where it is analized. In accordance with this analysis of the error signal, the parameter adjustment processor 7 may then change the parameter set controlling the transfer characteristic of the digital signal processor 2 and/or the model processor 6 to adapt or change the model as well. For this purpose the parameter adjustment processor 7 is also connected to the digital signal processor 2 and to the model processor 6.

In this analysis the parameter adjustment processor 7 determines whether the error signal is inside an acceptable range of values or not. If the error signal is outside an acceptable range of values, the parameter adjustment processor operates on the digital signal processor 2 to change its set of parameters and, eventually, sets up a new acceptable range for the error signal and/or adapts or corrects the process in the model processor 6 to change or adapt the model.

This means that the process in the parameter adjustment processor 7 is changed to an improved process and thus also to an improved model in the model processor 6. This new model function now controls the digital signal processor 2 to adapt the output of the receiver 3 in such a way as to approach the signal in front of the eardrum as closely as possible and, of course, preferably in real time, to the desired sound signal in front of the eardrum.

It goes without saying that the operation between the units 5, 6 and 7 can be analog or digital, with the corresponding analog to digital and digital to anlalog converters in the corresponding locations This is state of the art.

After this detailed description of the circuitry and operation of fig. 1 the following figures and their operation can be described in less detail,

the more so as several processors are substantially the same and are designated with the same reference numerals.

All systems variations, i.e.single channel or multiple channel hearing aids which were already described with respect to fig. 1 apply, mutatis mutandis, to figs. 2, 3 and 4 as well and need not to be repeated.

Fig. 2 shows a similar hearing aid for performing the inventive method, comprising an input transducer, a microphone 1, a digital processing system including f.i. at least one digital signal processor 2, an output transducer 3, a sensing means 4, a comparison means 5, a model processor 6 and a parameter adjustment processor means 7, which prefereably is incorporated into the model processor 6.

Additionally, a further modification means or correction means 8 between the output of the digital signal processor 2 and the output transducer 3 for further influencing the output signal of the output transducer 3 in real time, is also connected to the comparison means 5 to control the input signal for the output transducer 3.

The possible material difference between the output signal of the sensing means 4 and the output signal of the model processor 6 and the processor 7 in comparison means 5 results again in an error signal which will also directly influence the output signal of the digital signal processor 2 via the modification means 8 and consequently the input signal to the output transducer3. This will diminish or reduce the error signal almost immediately.

This may be of particular interest in case the error signal is the result of an erroneous transmission of an audio signal through the hearing aid into the sensing means, i.e. the probe micrpohone 4.

This error signal may also have been caused by other sources which may introduce a sound signal into the earcanal or the ear, f.i. occlusion effects, which could be overcome immediately.

The hearing aid shown in fig. 3 is in many respects quite similar to the hearing aids shown in figs. 1 and 2 so that all generic remarks made in connection with those figs. apply also in fig. 3.

However, the hearing aid shown in fig. 3 differs in a material way from the previous figures.

One input signal for the model processor 6 is now derived at the output of the digital signal processor 2 and not from its input side. Thus, the model processor 6 does not have to emulate similar processing capabilities as provided in the digital signal processor and therefore can be less complex.

However, both systems have their advantages. The system in figs. 1 and 2 gives more time to process the signal in the model processor 6, for generating the model, whereas deriving the input signal for the model processor 6 from the output of the digital signal processor 2 reduces the processing time in the model processor 6, and reduces the complexity of the model processor 6, that would have been required.

Finally, fig. 4 shows another embodiment of a hearing aid for performing the inventive process.

Fig. 4 shows an arrangement similar to the one shown in figs. 1 and 2, where the model processor 6 is connected to the input side of the digital signal processor 2 or even to the output side of the microphone 1.

However, the sensing means, i.e. the probe microphone is now connected to a probe signal correction processor 9 which could include an analog to digital conversion means and even means for frequency characteristic correction and frequency band splitting, if so required. Such preprocessing for frequency characteristic correction can be of real advantage because it may then not be necessary to correct the individual probe microphone characteristics in the model processor 6.

As can be seen from fig. 4 the probe signal processor 9 may be controlled and adjusted from parameter adjustment processor 7. The pro-processed probe microphone signal and the output from the model processor 6 are both applied to comparison means 5. In case there is a material difference between the two signals applied to comparison means 5, an error signal is developed to influence the parameter adjustment processor 7 in the way as described in connection with figs. 1 and 2.

At the same time, the error signal developed at comparison means 5 influences the process in the parameter adjustment processor 7 which results in an adjustment of the model in the model processor 6 and determines the transmission characteristic of the digital signal processor 2 and finally, of course, the input signal to the output transducer, i.e. the receiver 3 and thus the sound signal in the earcanal in front of the eardrum as closely as possible to the desired sound or sound pressure levels.

Generally, it may be said that in fig. 1 there is shown only one input to a model processor 6, one comparison means 5 and, of course, one error signal developed from a comparison of the output signal of the sensing means and the model from the model processor 6 and in conjunction with the function in parameter adjustment processor 7. There are, of course, possibilities to use multiple processors to create multiple error signals as well.

With this new method a more sophisticated adjustment or correction of the sound signal appearing in front of the eardrum, almost in real time, will be possible.

PATENTCLAIMS

1. Method to measure and correct or adjust the sound signal presented to the eardrum by means of a hearing aid in its operational position, including at least one microphone (1), at least one digital signal processing system comprising at least one digital signal processor (2) for transforming the incoming sound into a transformed signal in conformity with a desired transformation function, having at least one receiver (3) and a power supply, as well as at least one sensing means (4) for sensing the signal appearing in front of the eardrum, and at least one comparison means (5), characterized by

   A establishing a model of the electroacounstic system comprising the ear and the hearing aid, said model simulating the actual sound signal in the ear canal in front of the eardrum, and storing said model in the hearing aid,

   B sensing the actual signal appearing in front of the eardrum, converting said sound signal into a digital representation and feeding it back to an input of the digital signal processing system,

   C comparing said digital representation of said sensed signal with said model in said comparison means (5) and, in case there is a material difference between the sensed signal and the model, to generate an error signal for adjusting said model to the actual sound environment in front of the eardrum, and by further using said error signal to adaptively modify the process in said digital signal processor (2) by minimizing said error signal.

2. Method according to claim 1, characterized by storing said model in a model processor (6) and using said material difference from said comparison as an error signal to adaptively modify said model in said model processor, updating said model to the actual sound environment in front of the eardrum.

AMENDED SHEET

3. Method according to claim 1, characterized by using said material difference of the comparison as an error signal for a parameter adjustment processor (7) in said digital signal processing system for adjusting the process in said digital signal processor (2).

4. Method according to anyone of the claims 1 to 3, characterized by using said material difference from said comparison as an error signal for said parameter adjustment processor (7) to modify the model in said model processor.

5. Method according to anyone of the claims 1 to 4, characterized by using said material difference of said comparison as an error signal for said parameter adjustment processor (7) to adjust the transformation parameters of said digital signal processor (2) and said model function in said model processor (6).

6. Method according to anyone of the claims 1 to 5, characterized by using said material difference from said comparison as an error signal for a process in a microphone signal correction processor (9) connected between said sensing means (4) and said comparison means (5).

7. Method according to anyone of the claims 1 to 3, characterized by using said material difference from said comparison as an error signal to modify the transformed signal of said digital signal processor (2) in a modification means(8).

8. Method according to claim 1, characterized by using said at least one comparison means (5), said model processor (6) and said parameter correction processor (7) and even the said microphone signal correction processor (9) as at least parts of the electroacoustic model.

AMENDED SHEET

9. Method according to claim 1, characterized by using a probe microphone as said at least one sensing means (4).

10. Method according to claim 1, characterized by using said receiver (3) as said at least one sensing means (4).

11. Hearing aid including means to measure and correct or adjust the sound signal presented to the eardrum in its operational position, including at least one microphone (1), at least one digital signal processing system comprising at least one digital signal processor (2) for transforming the incoming sound into a transformed signal in conformity with a desired transformation function, having at least one receiver (3) and a power supply, as well as at least one sensing means (4) for sensing the sound signal appearing in front of the eardrum, and at least one comparison means (5), characterized in that said signal processing system includes processing and storing means (6) adapted to hold a model function of the electroacoustic system comprising the ear and the hearing aid, thus, simulating the actual sound signal in front of the eardrum, the said comparison means (15) being adapted to compare the signal sensed in front of the ear drum with the said model function to generate at least one error signal for adjusting said model to the actual sound environment in front of the eardrum, and that the digital signal processing system also contains modification means (7;8) for effecting, in response to said at least one error signal a modification of the output signal of the digital signal processor (2) into a corrected transformed signal, in case there is a material difference between said sensed signal and said simulated model.

12. Hearing aid in accordance with claim 1, characterized in that said modification means (8) in said signal processing system is arranged to receive said at least one error signal from said comparison means (5) to modify said transformed signal.

AMENDED SHEET

13. Hearing aid according to claim 11, characterized in that the modification means (7; 8) in said signal processing system contains a parameter adjustment processor (7) that is arranged to receive said at least one error signal from said comparison means (5) to adaptively modify the process in said digital signal processor (2).

14. Hearing aid according to claim 11, characterized in that the modification means (7; 8) in said signal processing system contains a parameter adjustment processor (7) that is arranged to receive at least one error signal from said comparison means (5) to adaptively modify the process in said model processor.

15. Hearing aid in accordance with claim 11, characterized in that the modification means (7; 8) in that signal processing system contains a parameter adjustment processor (7) that is arranged to receive said at least one error signal from said comparison means (5) to adaptively modify the process in said digital signal processor (2) and in said model processor (6).

16. Hearing aid in accordance to claim 11, characterized in that a microphone signal correction processor (9) is provided between sensing means (4) and the comparison means (5), said processor (9) being arranged to receive said at least one error signal from said comparison means (5) to adaptively modify the process in said microphone signal correction processor (9).

17. Hearing aid according to claim 11, characterized in that at least one comparison means (5), said model processor (6) containing a parameter correction processor (7) and even said microphone signal correcting processor (9) are at least parts of the electroacoustic model.

09/830922

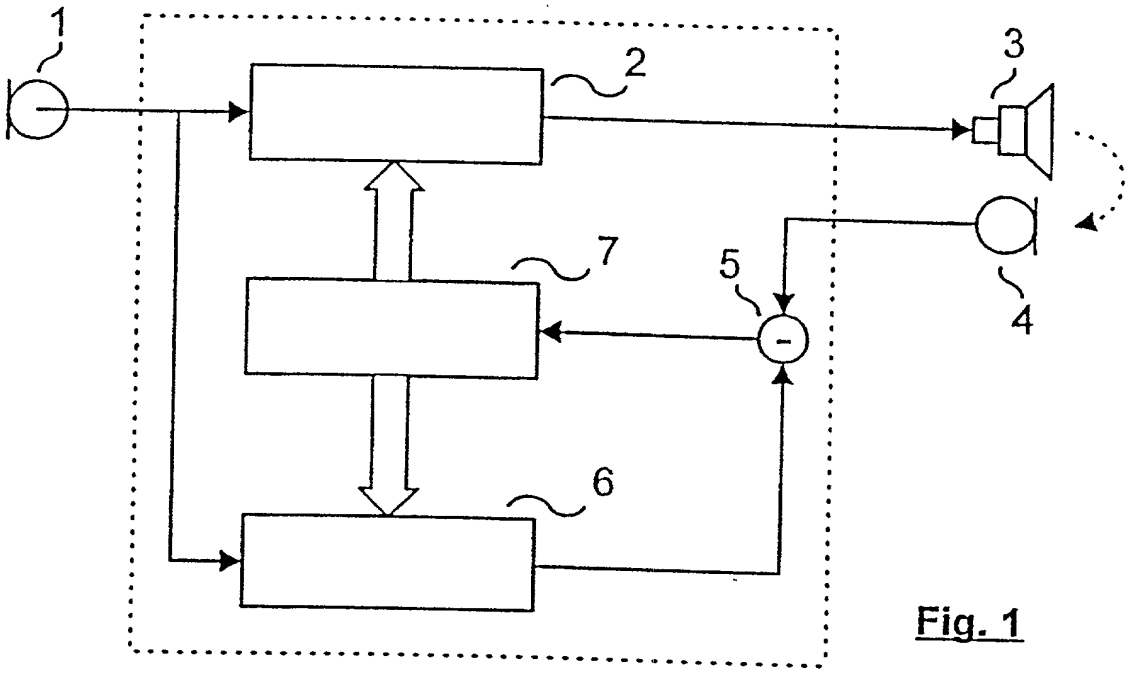

Fig. 1

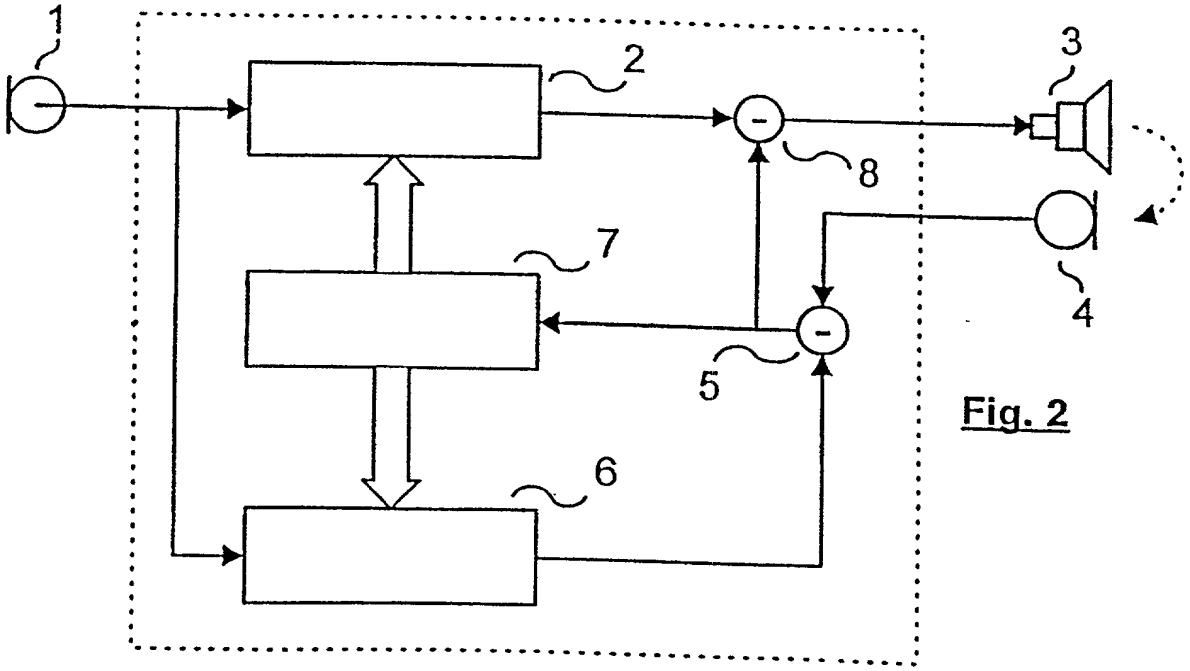

Fig. 2

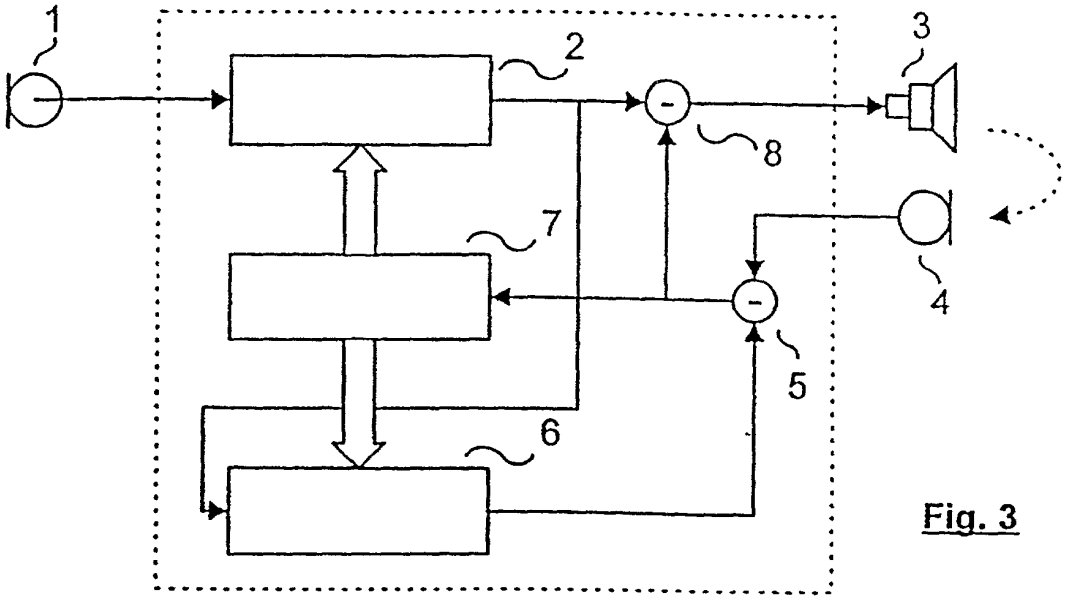

Fig. 3

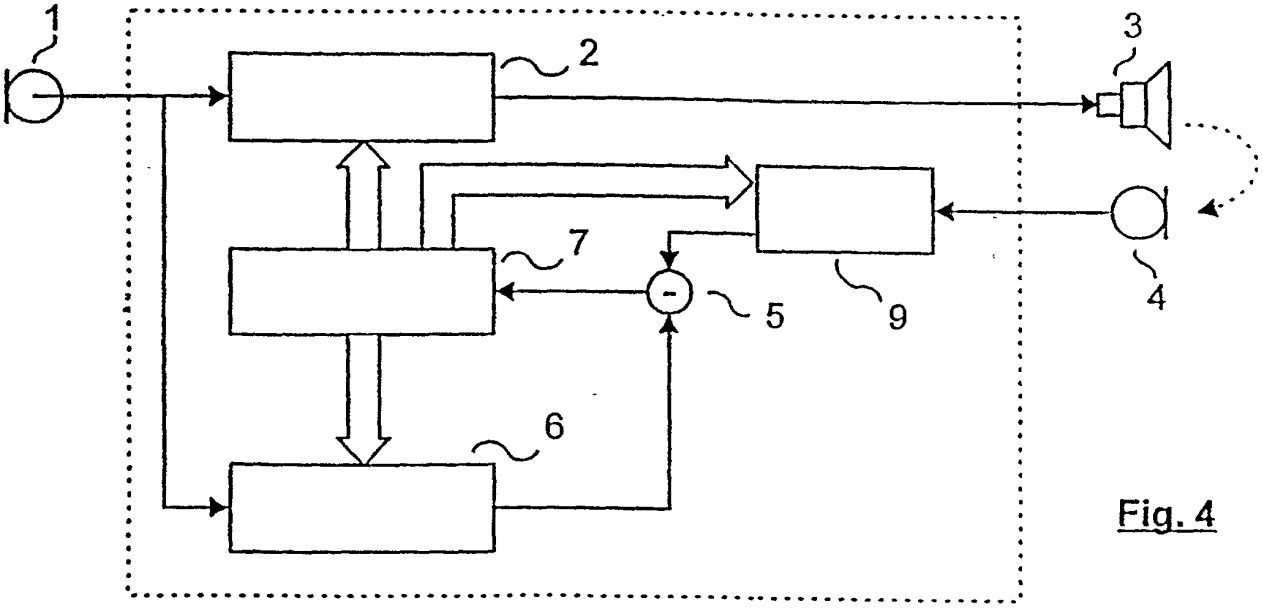

Fig. 4

SOLE/JOINT-Attorney Docket Q63556

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that my residence, mailing address and citizenship are as stated below next to my name: that I verily believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter claimed and for which a patent is sought in the application entitled:

METHOD FOR IN-SITU MEASURING AND CORRECTING OR ADJUSTING
THE OUTPUT SIGNAL OF A HEARING AID WITH A MODEL PROCESSOR
AND HEARING AID EMPLOYING SUCH A METHOD

which application is:
☐ the attached application
(for original application)

PCT/EP98/07131 filed November 9, 1998
☑ Application No. _____
(Confirmation No.)
filed , and amended on

(for declaration not accompanying application)

that I have reviewed and understand the contents of the specification of the above-identified application, including the claims, as amended by any amendment referred to above; that I acknowledge my duty to disclose information of which I am aware and which is material to the patentability of this application as defined in 37 C.F.R. 1.56, that I hereby claim priority benefits under Title 35, United States Code §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, §119(e) of any United States provisional application(s), or §365(a) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate or of any PCT International application having a filing date before that of the application on which priority is claimed:

Application Number	Country	Filing Date	Priority Claimed Yes	Priority Claimed No
PCT/EP98/07131	European	November 09, 1998	☑	☐

I hereby claim the benefit under 35 United States Code §120 of any United States application(s), or §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in a listed prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge my duty to disclose any information material to the patentability of this application as defined in 37 C.F.R. 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application No.	Filing Date	Status

I hereby appoint John H. Mion, Reg. No. 18,879; Thomas J. Macpeak, Reg. No. 19,292; Robert J. Seas, Jr., Reg. No. 21,092; Darryl Mexic, Reg. No. 23,063; Robert V. Sloan, Reg. No. 22,775; Peter D. Olexy, Reg. No. 24,513; J. Frank Osha, Reg. No. 24,625; Waddell A. Biggart, Reg. No. 24,861; Louis Gubinsky, Reg. No. 24,835; Neil B. Siegel, Reg. No. 25,200; David J. Cushing, Reg. No. 28,703; John R. Inge, Reg. No. 26,916; Joseph J. Ruch, Jr., Reg. No. 26,577; Sheldon I. Landsman, Reg. No. 25,430; Richard C. Turner, Reg. No. 29,710; Howard L. Bernstein, Reg. No. 25,665; Alan J. Kasper, Reg. No. 25,426; Kenneth J. Burchfiel, Reg. No. 31,333; Gordon Kit, Reg. No. 30,764; Susan J. Mack, Reg. No. 30,951; Frank L. Bernstein, Reg. No. 31,484; Mark Boland, Reg. No. 32,197; William H. Mandir, Reg. No. 32,156; Brian W. Hannon, Reg. No. 32,778; Abraham J. Rosner, Reg. No. 33,276; Bruce E. Kramer, Reg. No. 33,725; Paul F. Neils, Reg. No. 33,102; Brett S. Sylvester, Reg. No. 32,765; Robert M. Masters, Reg. No. 35,603, George F. Lehnigk, Reg. No. 36,359, John T. Callahan, Reg. No. 32,607, Steven M. Gruskin, Reg. No. 36,818, Peter A. McKenna, Reg. No. 38,551 and Edward F. Kenehan, Reg. No. 28,962, my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and request that all correspondence about the application be addressed to **SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC**, 2100 Pennsylvania Avenue, N.W., Washington, D.C. 20037-3213.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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